

CLAIMS

What is claimed is:

1. A solar cell (20) comprising:
  - a photovoltaic energy source (22) having a front face (24) and an oppositely disposed back face (26);
    - a frontside array of metallic gridlines (38) deposited upon the front face (24) of the photovoltaic energy source (22); and
      - a busbar structure (42) in electrical continuity with the frontside array of metallic gridlines (38), the busbar structure (42) comprising
        - an electrical insulator layer (44) overlying and contacting the front face (24) of the photovoltaic energy source (22), and
        - 10 a metallic busbar layer (48) overlying and contacting the electrical insulator layer (44), wherein the metallic busbar layer (48) is in electrical continuity with the frontside array of metallic gridlines (38).
  2. The solar cell (20) of claim 1, wherein the photovoltaic energy source (22) comprises exactly two layers (34) of semiconductor material.
  3. The solar cell (20) of claim 1, wherein the photovoltaic energy source (22) comprises more than two layers (34) of semiconductor material.
  4. The solar cell (20) of claim 1, wherein the solar cell (20) further includes
    - a backside metallic electrode (40) overlying and contacting the back face (26) of the photovoltaic energy source (22).
  5. The solar cell (20) of claim 1, wherein the electrical insulator layer (44) is an oxide or a nitride.
  6. The solar cell (20) of claim 1, wherein the electrical insulator layer

(44) has a thickness of from about 0.3 to about 2 micrometers.

7. The solar cell (20) of claim 1, wherein the electrical insulator layer (44) extends laterally beyond the metallic busbar layer (48).

8. The solar cell (20) of claim 1, further including a solar concentrator (28) disposed to concentrate solar energy toward the front face (24) of the photovoltaic energy source (22).

9. The solar cell (20) of claim 1, further including a solar concentrator (28) disposed to concentrate solar energy toward the front face (24) of the photovoltaic energy source (22) with a concentration ratio of more than 200 suns.

10. The solar cell (20) of claim 1, further including a solar concentrator (28) disposed to concentrate solar energy toward the front face (24) of the photovoltaic energy source (22) with a concentration ratio of from about 300 to about 500 suns.